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How has the persistence of market timing's effect on capital structure changed?

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Abstract

This paper examines, how persistent the market timing's effect on capital structure is. The effect is examined by using two samples of North American IPOs between 1971-1999 and 2000-2015. In this research market timing is defined based on monthly IPO volume, dividing markets into hot and cold markets. This study has three major findings. First, hot market firms raise significantly more equity in their listing and as a result, decrease their leverage more than cold market firms. Second, the effect of IPO timing on capital structure shows very little persistence for the 2000-2015 sample. On the other hand, the 1971-1999 sample shows a significant effect on capital structure for at least four years after the IPO. Third, regression analyses show that the pure market timing effect, defined as the regression coefficient value for the number of IPOs in the sample, has very little impact on the 2000-2015 sample compared to the 1971-1999 sample.

Keywords Market timing, IPO, Capital structure, Hot and cold markets

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1. Introduction

Graham and Harvey (2001) surveyed 392 CEOs and found that two-thirds of them regarded market timing as an important factor in financing decisions. Variety of other studies like Alti, (2006) and Baker and Wurgler (2007), show that corporate market timing is an important factor in equity issues. While the market timing effect in equity issues is widely recognized, there is no mutual understanding on how to define market timing. Previous literature has defined market timing based on the level of underpricing (Ritter 1984), investment sentiment index (Baker and Wurgler 2007) and the number of IPOs in a given time period (Liang 2004) and (Alti 2006). One common finding in many of these studies is, that timing equity issues, especially IPOs, is mainly a byproduct of market conditions rather than firms' need for capital.

A variety of studies are also conducted about the differences between firms that time their equity issues and those that do not. Baker and Wurgler (2002) find that hot markets attract firms that might find it difficult to go public during a cold market. Rajan and Servaes (1997) find that firms with high analyst growth projections underperform their benchmark firms while firms with the lowest analyst growth projections outperform these benchmark firms. They also find that this effect only increases with longer time period, which might in part explain the significant long-term underperformance of hot IPO firms. These studies are consistent with the widespread findings of inferior quality of hot market listers, measured in terms of post-IPO performance as found in studies like Chang et al. (2013) and Loughran and Ritter (1997).

Past studies have had very different measurements of market timing as well as findings on the persistence of timing attempts on capital structure. Alti (2006) used monthly IPO volume while Baker and Wurgler (2002) used historical market to book ratio as a basis of defining market timing. These two papers also found contrary results while using the same sample period. Alti (2006) found very little persistence on the effect of market timing, but Baker and Wurgler (2002) found that the timing effect on capital structure persisted beyond ten years.

To my knowledge, there are no studies on the subject with a recent data. As the data used by both Alti (2006) and Baker and Wurgler (2002) end at 1999. Even the data used by Chang. et al. (2013) is only up to 2005, which does not include the significant increase in the number of IPO leading to the 2008 financial crisis and the following period of low IPO volume. The

purpose of this thesis is therefore to measure how persistence the effect of market timing on capital structure is and how has it changed from the more researched 1971-1999 period to 2000-2015 period. I use similar methods than Alti (2006) and complement his findings by more than doubling the sample size and increasing the time period significantly.

I find major differences between the two sample periods. First, hot market firms raise more proceeds than cold market firms and decrease their leverage more, but the difference between hot and cold market firms has decreased from the 1971-1999 sample to 2000-2015 sample. Second, contrary to the findings of Alti (2006), but in similar for those of Baker and Wurgler (2007) I find that the effect of market timing had persistent effect on capital structure during the sample consisting IPOs between 1971-1999. However, I find that the effect had very little persistence during the more recent sample of firms going public during 2000-2015. Furthermore, I find that the pure market timing effect, defined by regression coefficient measuring hot and cold markets, had almost no impact on the result during 2000-2015 sample while it was a significant contributor between the differences on hot and cold market firms in 1971-1999 sample as found in Alti (2006).

The remaining paper is structured as follows. Section 2 presents literature review on market timing and its effect on capital structure and describes the research hypothesis. Section 3 presents the data and defines the measurement of market timing. Section 4. Includes the findings about issuance activity between hot and cold market firms, short term effect of market timing on capital structure and how persistent the effect is. Section 5. Presents further findings IPO proceeds and firm leverage based on pre-IPO sales and leverage. Section 6 concludes the findings.

2. Literature review and hypotheses

2.1 Literature review

A study of the efficient and integrated capital markets by Modigliani and Miller (1958), find that the costs of different forms of capital do not vary independently. This means that there is no gain from opportunistically changing between equity and debt as cited in Baker and Wurgler (2002). However, several studies show the existence of market timing, which in efficient capital markets would draw no benefits.

Baker and Wurgler (2002) find several different kinds of studies that offers a strong support for the existence of market timing effect. First are studies that observe market timing based on the actual financing decisions. They find that firms tend to issue more equity when they can get it is at a lower cost. Second are studies based on long-term stock market return. They concluded that firms on average sell equity when valuations are relatively high and repurchase it when valuations are relatively low. Third are studies that found firms issuing more equity when investors are optimistic about firms' earning forecasts, which is also found in Rajan and Servaes (1997).

Other studies try to explain the reasons for the fluctuation of the number of IPOs. Allen and Gaulhaber (1989) claim that underpricing has a signaling role for other high-quality firms to go public as they can reduce the adverse selection problem. On the other hand, Baker and Wurgler (2002) claim that high number of IPOs draw weaker firms into going public as they might find it hard to go public during a cold IPO market. According to Chang. et al. (2013) the previous finding of weaker firms entering the IPO markets when they see many other firms going public divides firms going public as "pioneers" and "followers" based on how early during the hot IPO market they list their shares. They find that these "followers" are the main reason we see hot market firms with worse long-run performance after the IPO than cold market firms. Chemmanur and He (2011) explain the clustering of IPOs based on product market competition. Their model suggests that even firms with enough cash holdings might find it worth to go public if their competitors do. Market conditions clearly have a significant effect on IPOs clustering into a waves of high and low IPO volume.

The same paper where Graham and Harvey (2001) found CEOs considering equity timing to an important factor in financing decisions they surveyed CEOs and found that only 10% on responder firms had a strict target leverage. 37% of their respondent firms had a flexible target leverage ratio and 34% had a somewhat tight target or range for leverage. In addition to all other studies, these responses concerning target capital structure suggest that market timing attempts are more important than specific capital structure, at least in a short time period.

2.2 Hypotheses

By following the methods used in Alti (2006) to research how persistent the market timings' effect on capital structure is and then research how it has changes over time by comparing two samples containing firms listing during 1971-1999 and 2000-2015 time periods. I have two main hypotheses.

Hypothesis 1:

I expect that otherwise similar firms to raise more proceeds when listing in times of hot IPO markets than cold markets.

Hypothesis 2:

If hot market firms raise more capital than cold market firms, hot market firms should decrease their leverage ratios more than cold market firms do. Therefore, market timing would have an effect on firms' capital structures.

The rationale for my first and second hypotheses is the following. If firms see hot IPO markets as a window of opportunity to go public with temporarily low costs of equity as pointed in Alti (2006), otherwise similar firms should raise more proceeds than cold market firms as cold market firms want to sell as little equity as possible when there is a relatively high cost to it. Because hot markets firms would then increase their capital more than they would need for their operations, I assume that they are likely to use more proceeds to decrease their leverage and therefore affecting their capital structure more than cold market firms.

The research question then is that how persistent this effect on capital structure is, and how it has changed from 1971-1999 to 2000-2015.

3. Data and definition of market timing

3.1 Data

Table 1 reports variable means and standard deviations for firm characteristics. The data is gathered by starting with a sample consisting of all North American IPOs reported by SDC Platinum. I exclude spinoffs, unit offers and financials firms with SIC codes between 6000 and 6999 as in Alti (2006) and Baker and Wurgler (2002). This leaves a sample of 10876 IPOs. I link the SDC data to CRSP data using historical CUSIP numbers and get CRSP PERMCO number for all the firms. I then use CRSP/COMPUSTAT merged database to get COMPUSTAT GVKEY for all the firms and use that to get COMPUSTAT financials for all firms. I then select firms that have pre-IPO financials and IPO year-end total assets of over $10m in COMPUSTAT.[1] That leaves a sample of 5255 IPOs and firm financials for pre-IPO and IPO year.

Information for issue date, total proceeds, primary proceeds, SIC codes and offer price come from SDC while other firm figures come from COMPUSTAT. COMPUSTAT firm characteristics are defined as follows[2]: Total Assets, A, is COMPUSTAT annual item 6. Book Debt, D, is total liabilities (item 181) and preferred stock (item 10), minus deferred taxes (item 35). Preferred stock is replaced by preferred stock redemption value when missing (item 56). Book Equity, E, is total assets (item 6) minus book debt. Market value, M, is market value of equity plus book debt, where market value of equity is calculated as year-end share price (item 24) multiplied by the number of outstanding shares (item 25). Book value, B, is the same as total assets. The variable SIZE is natural logarithm from net sales (item 12). Variables new debt issues, d, and new equity issues are calculated by the change in book debt divided by total assets and change in book equity divided by total assets respectively. EBITDA/A is earnings before interest, taxes and depreciation divided by total assets. PPE/A is net plant, property and equipment. R&D/A is research and development cost. INV/A is capital expenditures. DIV/E is common dividend divided by book equity and CASH/A is cash and short-term investments.

[1] This requires pre-IPO financials that might cause selection bias. However, most of the firms in the sample did have pre-IPO financials like in Alti (2006)

[2] Baker and Wurgler (2002) and Alti (2006) used similar definitions for firm characteristics

Table 1: Summary of Firm Statistics

The table reports average firm characteristics and standard deviations from the year prior the IPO to 7 years after the IPO. Firm characteristics are defined as follows: D/A is defined as book debt divided by total assets where book debt, D, is total liabilities (item 181) and preferred stock (item 10), minus deferred taxes (item 35). Preferred stock is replaced by preferred stock redemption value when missing (item 56). M/B is defined as market value of equity plus book debt divided by total assets. Market value of equity is calculated by year-end share price (item 24) multiplied by the number of outstanding shares (item 25). New debt issues d/A and new equity issues e/A are calculated by the change in book debt and book equity divided by year-end total assets. ΔRE/A is change in retained earnings. EBITDA/A is earnings before interest, taxes and depreciation divided by total assets. SIZE is natural logarithm from net sales (item 12). PPE/A is net plant, property and equipment. R&D/A is research and development cost. INV/A is capital expenditures. DIV/E is common dividend divided by book equity and CASH/A is cash and short-term investments. Values for d/A, e/A, ΔRE/A, EBITDA/A, INV/A or DIV/E that exceed 100% in absolute terms are dropped from summary statistics as well as M/B values over 10. The sample consists of North American IPOs reported by SDC platinum from January 1971 to December 2015 where COMPUSTAT financials are available for the year prior to the IPO. Spinoffs, unit offers and financials firms with SIC codes between 6000 and 6999 are dropped from the sample. Firms that had COMPUSTAT total assets below $10m after the IPO year are also excluded from the sample. Last year of COMPUSTAT data used is 2018.

	N	D/A	M/B	d/A	e/A	ΔRE/A	EBITDA/A	SIZE	PPE/A	R&D/A	INV/A	DIV/E	CASH/A
IPO -1	5255	77,84	—	—	—	—	4,52	3,48	25,65	18,93	9,47	2,18	23,18
		25,80	—	—	—	—	*31,16*	*1,97*	*23,03*	*77,14*	*11,46*	*11,30*	*26,92*
IPO	5255	37,88	2,67	9,15	46,49	-4,93	5,04	3,94	21,69	6,75	8,49	2,22	35,65
		24,97	*1,75*	*48,85*	*30,32*	*21,04*	*22,57*	*1,79*	*22,31*	*11,33*	*10,85*	*9,23*	*31,26*
IPO + 1	4976	39,99	2,26	21,11	7,18	-6,06	2,28	4,26	24,12	9,12	9,05	0,68	29,57
		24,87	*1,59*	*34,25*	*27,96*	*22,93*	*25,03*	*1,75*	*22,81*	*17,05*	*10,30*	*4,81*	*28,63*
IPO + 2	4560	42,85	2,10	14,21	1,97	-7,70	1,36	4,44	25,18	10,08	7,55	0,70	26,99
		25,83	*1,56*	*33,35*	*27,05*	*23,77*	*25,22*	*1,80*	*23,16*	*18,46*	*8,86*	*4,95*	*27,60*
IPO + 3	4149	45,30	2,04	11,62	1,18	-8,03	1,87	4,59	25,31	10,88	6,50	0,65	25,50
		26,51	*1,56*	*32,36*	*25,06*	*23,58*	*23,75*	*1,82*	*23,26*	*27,79*	*7,67*	*4,21*	*26,97*
IPO + 4	3730	46,21	2,05	8,21	1,06	-7,43	2,59	4,73	25,10	10,74	6,07	0,72	24,85
		27,16	*1,56*	*31,65*	*25,37*	*22,36*	*22,80*	*1,84*	*23,03*	*33,83*	*7,21*	*4,37*	*26,45*
IPO + 5	3278	46,48	1,98	7,69	1,61	-5,91	4,06	4,87	25,32	9,99	5,99	0,83	23,57
		27,05	*1,49*	*31,02*	*23,51*	*20,95*	*21,35*	*1,87*	*23,21*	*31,81*	*7,13*	*4,99*	*25,40*
IPO + 6	2909	47,16	1,94	7,21	1,27	-5,09	4,88	5,01	25,37	9,00	5,66	0,90	22,92
		26,87	*1,47*	*31,10*	*23,34*	*21,07*	*20,62*	*1,86*	*23,31*	*20,34*	*6,76*	*4,87*	*25,02*
IPO + 7	2613	47,46	1,94	6,39	1,73	-5,07	4,89	5,09	25,44	9,11	5,56	0,84	22,63
		26,85	*1,54*	*30,03*	*22,84*	*21,27*	*21,10*	*1,93*	*23,43*	*28,60*	*6,83*	*4,25*	*24,49*

All variables except M/B and SIZE are reported in percentage terms. Values of e/A, d/A, ΔRE/A, EBITDA/A, INV/A and DIV/E are dropped out if the absolute value exceeds 100%. In subsequent regressions these values are replaced by 100% and -100% respectively.

I find that leverage decreases significantly during the IPO year which is expected as firms raise significant amount of equity from their IPO. Profitability decreases substantially after the IPO which is also documented by Mikkelson. Et al. (1997) and Alti (2006). Cash compared to assets also increases substantially in the IPO year and decreases steadily to pre-IPO levels a few years after the IPO. Size increases steadily every year after the IPO.[3]

3.2 Definition of market timing

Other literature has used many different methods for defining market timing, but the common problem for many of them is that are likely to pick some other determinants of issuing activity. For example, using market to book ratio as a proxy for market timing it is likely to be affected by growth prospects of firms as fast growing firms tend to have high market to book ratio and more need for capital. Stock return-based market timing measures on the other hand require historical data on stock market returns. To eliminate the concerns mentioned above, I use a simple market timing definition based on monthly IPO volume as used in (Liang 2004) and Alti (2006). I focus on the initial public offering as the financing event for various reasons. First, it is easily the most important financing decision a firm will make. Second, it is a one-time event which has a significant effect on capital structure. This makes is relatively easy to compare capital structure before and after the IPO. Thirdly, it has the most asymmetric information between management and investors which leads to greatest changes of misvaluation, which is a major reason for market timing attempts as stated by Alti (2006).

I use the sample of firms that have pre-IPO COMPUSTAT financials and total assets over $10m at the end of the IPO year. To smooth out monthly variation I use a 3-month centered moving average as the number of IPOs as in Helwege and Liang (2004) and Alti (2006). Results are reported in figure 1. I define hot IPO markets as those months that experience more than the median number of IPOs. Since the median number of IPOs during subsample of 1971-1999

[3] I do not consider firms exiting COMPUSTAT in any way which might make some result biased

and 2000-2015 are so close to each other (6,5 vs 7), I use the median number of IPOs for the whole sample period (6,67) as the measurement of hot and cold IPO months. Market timer firms are then defined as those that go public during a hot IPO month. For all the following regressions the variable HOT gets a value of one when the firms went public during a hot market and value zero otherwise. From the sample of 5225 IPOs, 4606 (88%) occurred during hot market and 619 (12%) during cold market.

While the median number of monthly IPOs during 1971-1999 and 2000-2015 is relatively similar, there is significant difference between how much is has fluctuated during these sample periods. This might have an effect to the results concerning market timing effect.

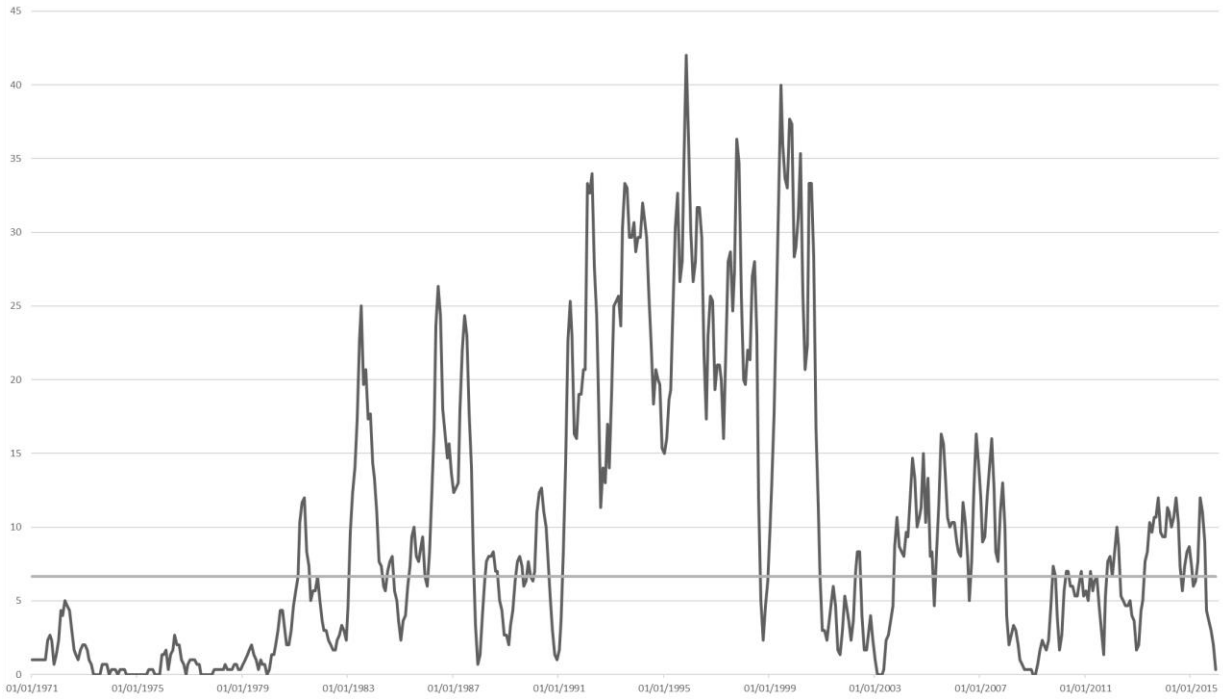

Figure 1: Centered 3-month moving average on the number of IPOs
Horizontal line is the monthly median.

4. Market timing and impact on capital structure

4.1 Market timing and IPO proceeds

Hot IPO markets have better conditions for listings than cold IPO markets because the cost of equity and cost of adverse selection among other factors are more favorable. This will lead to more IPOs and more IPO proceeds during hot market times than during cold market times. I examine this hypothesis by comparing the mean values for hot and cold market IPO proceeds and other relevant known determinants of issuance activity. I capture the market timing effect by measuring how hot and cold market firms differ in terms of equity issues and how much of an effect does pure market timing have in it. I measure the effect of pure market timing as coefficient value for hot market dummy in the regressions.

Table 2 panel A includes mean values among hot and cold market firms. Panel B includes regression analysis, where the dependent variable Y_t is total proceeds divided by IPO year-end assets, primary proceeds divided by IPO year-end assets, primary proceeds divided by pre-IPO assets, share of primary shares issued, offer price divided by book value of assets and new debt issues divided at the IPO year assets. Regression form is as follows:

$$Y_t = x_0 + x_1 HOT + x_2 M/B_t + x_3 EBITDA/A_{t-1} + x_4 SIZE_{t-1} + x_5 PPE/A_{t-1} + x_6 R\&D/A_{t-1} + x_7 RDD_{t-1}\, x_6 + D/A_{t-1} + \varepsilon$$

I use the same regression coefficients as Alti (2006) which are dummy variable hot, which measures market timing attempts, market to book ratio, lagged profitability, lagged size variable, lagged plant, property and equipment variable, research and development variable, RDD dummy which takes the value of one if research and development is not reported and lagged book leverage. He finds that previous research recognizes these factors as the key determinants of financing policy (Titman and Wessels (1988), Rajan and Zingales (1995)).

Hot market firms raise on average more proceeds than cold IPO firms. The difference between these two is 26% primary proceeds and 19,5% for total proceeds when compared to IPO year end assets. This difference in primary proceeds increases to 53% when comparing to pre-IPO assets, since IPO year assets already include the proceeds received from the IPO.

Despite these differences being significant in the whole sample as well as in the two subsamples, I find some notable differences between equity issuance between the two

subsamples. First, the amount of capital raised in the IPO has increased for both hot and cold market IPOs in the 00-15 sample period, but the difference between the amount of proceeds has decreased substantially when comparing to the sample consisting of 1971-1999 IPOs. Hot market firms raised 51 percent more primary proceeds to IPO-year end assets compared to cold market firms in 1971-1999 period and only 16 percent more in the 2000-2015 sample period. Regression analysis in panel B shows that the effect of market timing, measured by the value of the variable hot, was almost identical with the differences between hot and cold market IPO proceeds. Looking at the more recent sample of IPOs, the effect on pure market timing has almost vanished.

The differences between other measurements of issuance activity between hot and cold market firms, such as the proportion of shares sold at the IPO and offer to book value, have declined significantly.

Table 2: The market timing effect on issuance activity

All regressions consider the industry fixed effect defined by 3-digit SIC code. Panel A reports mean values for hot and cold market firms and the t-value of their difference. Panel B includes regression coefficients of regressions of the form:

$$Y_t = x_0 + x_1 HOT + x_2 M/B_t + x_3 EBITDA/A_{t-1} + x_4 SIZE_{t-1} + x_5 PPE/A_{t-1} + x_6 R\&D/A_{t-1} + x_7 RDD_{t-1}\, x_6 + D/A_{t-1} + \varepsilon$$

The dependent variable Y_t is total proceeds divided by IPO year-end total assets, primary proceeds divided by IPO year-end total assets, primary proceeds divided by pre-IPO year-end total assets, primary shares issued at the IPO divided by IPO year-end outstanding shares, firm value at offer share price divided by total asset at IPO year-end and new debt issues divided by IPO year-end total assets. All regressions and mean values are for the whole sample as well as subsamples 1971-1999 and 2000-2015. All variables except offer to book ratio are expressed in percentage terms.

	Total Proceeds/Total Assets			Primary Proceeds/Total Assets			Primary Proceeds/Total Assets$_{t-1}$			%-Issued			Offer / Book			d/At		
	71-15	71-99	00-15	71-15	71-99	00-15	71-15	71-99	00-15	71-15	71-99	00-15	71-15	71-99	00-15	71-15	71-99	00-15
Panel A: Mean Values																		
HOT	58,98	57,47	63,34	50,00	47,42	57,34	164,75	157,83	184,22	24,92	25,19	24,14	3,69	3,50	4,22	-12,17	-5,89	-29,80
COLD	49,35	42,89	56,95	39,67	31,32	49,31	107,37	79,57	132,86	21,30	19,90	22,92	3,41	2,99	3,92	-13,27	4,11	-29,65
t-value	5,95	7,00	2,51	6,71	8,47	3,30	9,80	11,29	5,46	7,03	8,54	1,42	3,09	4,77	1,95	0,68	-7,10	-0,05
Panel B: Regression Analysis																		
HOT	7,55	15,86	-0,07	7,22	15,59	1,66	28,78	50,70	18,92	3,60	5,07	0,81	0,08	0,15	0,37	1,83	-4,31	3,77
	4,87	*7,51*	*-0,03*	*5,52*	*8,88*	*0,73*	*6,01*	*7,70*	*2,42*	*5,71*	*7,70*	*0,78*	*0,91*	*1,34*	*2,30*	*1,37*	*-2,56*	*1,53*
M/Bt	1,93	1,47	2,16	0,73	0,50	0,62	13,00	13,24	7,27	-1,97	1,32	-1,49	0,31	0,32	0,34	0,17	-0,26	0,74
	7,59	*4,92*	*4,10*	*3,40*	*2,03*	*1,33*	*16,62*	*14,36*	*4,50*	*-19,18*	*14,36*	*-6,96*	*21,46*	*19,35*	*10,33*	*0,78*	*-1,08*	*1,46*
EBITDA/At-1	13,83	18,54	8,76	-1,24	1,96	1,95	-35,54	-43,71	17,71	1,96	-4,37	3,33	-0,74	-0,02	-1,79	10,42	3,51	7,76
	6,47	*7,18*	*1,95*	*-0,69*	*0,92*	*0,48*	*5,41*	*-5,48*	*1,29*	*2,28*	*-5,48*	*1,84*	*-6,05*	*-0,17*	*-6,34*	*5,64*	*1,70*	*1,79*
SIZEt-1	-5,72	-6,67	-6,17	-5,49	-6,68	-5,72	-30,57	-35,49	-26,85	-1,21	-3,55	-0,50	0,11	0,03	0,13	-2,24	-1,88	0,04
	-17,45	*-15,92*	*-9,18*	*-19,66*	*-19,02*	*-9,53*	*-29,84*	*-26,92*	*-12,93*	*-8,96*	*-6,92*	*-1,80*	*5,37*	*1,30*	*3,15*	*-7,90*	*-5,61*	*0,06*
PPE/At-1	-7,84	-7,14	0,28	-6,14	-5,39	0,49	-17,00	-26,79	49,85	0,99	-26,79	-0,40	-0,08	0,01	0,24	10,09	0,46	21,20
	-2,60	*-2,06*	*0,04*	*-2,42*	*-1,89*	*0,08*	*-1,83*	*-2,50*	*2,35*	*0,81*	*-2,50*	*-0,14*	*-0,45*	*0,07*	*0,55*	*3,87*	*0,02*	*3,21*
R&D/At-1	28,34	34,08	13,31	24,63	27,52	18,25	177,72	160,81	230,58	6,22	16,08	3,88	-0,40	0,00	-1,26	-20,80	-21,34	-22,27
	7,21	*7,25*	*1,83*	*7,52*	*7,15*	*2,86*	*14,81*	*11,14*	*10,45*	*3,96*	*11,14*	*1,33*	*-1,80*	*0,01*	*-2,76*	*-6,13*	*-5,68*	*-3,18*
RDDt-1	-2,65	-1,47	-3,17	-0,54	0,59	-1,64	13,83	15,58	5,69	3,27	15,58	4,94	-0,16	0,00	-0,50	7,74	5,55	8,18
	-1,66	*-0,80*	*-0,88*	*-0,40*	*0,39*	*-0,51*	*2,80*	*2,74*	*0,52*	*5,05*	*2,74*	*3,39*	*-1,75*	*-0,01*	*-2,20*	*5,61*	*3,81*	*2,34*
D/At-1	5,18	2,27	9,36	10,47	8,75	9,89	31,14	35,45	14,37	7,60	35,45	4,09	1,10	0,97	0,97	-50,99	-40,65	-71,09
	2,44	*0,93*	*2,06*	*5,84*	*4,33*	*2,43*	*4,74*	*4,67*	*1,02*	*8,79*	*4,67*	*2,20*	*9,12*	*7,31*	*3,14*	*-27,76*	*-20,79*	*-16,04*
R-squared	0,115	0,129	0,115	0,156	0,186	0,135	0,368	0,402	0,313	0,117	0,402	0,063	0,147	0,142	0,155	0,241	0,189	0,264
N	4555	3319	1236	4461	3254	1207	4461	3254	1207	4434	3254	1200	4417	3236	1181	4543	3316	1227

Interestingly though, despites the difference between hot and cold markets firms' offer to book ratios declining, the effect of market timing is significant determinant. Other interesting observation is that hot market firms in the older sample decreased their leverage while cold market firms increased it during the IPO year. The differences in IPO year debt issues show no difference in the more recent sample and all the firms seem to decrease their leverages with a considerable amount during the IPO year. I suspect this is linked to the earlier observations that both hot and cold market firms raise more capital in the more recent sample compared to older sample. The portion of shares issued compared to outstanding share has also decreased from significant differences in the older sample to almost nonexistent in the more recent sample.

4.2 Comparison of hot and cold market firms

Table 3 shows that pre-IPO leverage for hot market firms was significantly more than those for cold market firms during the 1971-1999 sample, but the difference is nonexistent in the 2000-2015 sample. According to the regression analysis in panel B over half of the differences between pre-IPO leverages were because by the hot variable in the 71-99 sample. Differences in capital expenditures experience the same effect, which is that the 71-99 sample shows hot market firms spending less on capital expenditures, but the 00-15 sample shows equal amount of capital expenditures. This effect persists at least two years after the IPO.

EBITDA divided by total assets show persistently that hot market firms are less profitable than cold market firms. This is in line with other literature like Chemmanur and He (2011) that found hot market listers having lower post-IPO profitability than firms listing their shares during cold IPO market. Part of the reason might be because hot market firms have larger asset bases at the end of IPO year as suggested by Alti (2006), but the effect is large enough to not have been caused by this effect. The effect is present in the whole sample period as well as in both subsamples. Hot market effect seems to be a big reason for this effect as it contributes approximately half of the difference up to two years after the IPO. IPO year dividend payout is larger in hot market firms, but this difference is not statistically significant. Further examination which is not reported shows the same results for the years IPO + 1 and IPO + 2 for both subsamples.

Table 3: Comparison of hot and cold market firms

Panel A reports mean values for hot and cold market firms and the t-value of their difference. All values are reported in percentage terms. Panel B includes regressions for the whole sample period as well as subsamples 1971-1999 and 2000-2015. All regressions consider the industry fixed effect defined by 3-digit SIC code. Regression form is as follows:

$$Y_t = x_0 + x_1 HOT + x_2 M/B_{IPO} + x_3 M/B_{t-1} + x_4 EBITDA/A_{t-1} + x_5 SIZE_{t-1} + x_6 PPE/A_{t-1} + + x_7 R\&D/A_{t-1} + x_7 RDD_{t-1} + \varepsilon$$

	D/A PRE-IPO t			INV/At									EBITDA/At												DIV/EIPO		
	pre-IPO			IPO			IPO + 1			IPO + 2			IPO			IPO + 1			IPO + 2			IPO + 4			IPO		
	71-15	71-99	00-15	71-15	71-99	00-15	71-15	71-99	00-15	71-15	71-99	00-15	71-15	71-99	00-15	71-15	71-99	00-15	71-15	71-99	00-15	71-15	71-99	00-15	71-15	71-99	00-15
Panel A: Mean Values																											
HOT	78,26	76,22	83,97	8,25	8,90	6,36	8,96	9,82	6,48	7,41	8,16	5,28	3,95	7,92	-7,52	-0,46	3,80	-12,75	-1,82	1,94	-12,66	-0,12	2,79	-8,76	3,00	2,86	3,39
COLD	74,57	65,49	83,04	10,47	13,68	6,67	99,56	12,78	6,64	8,63	10,60	6,30	9,73	17,78	0,25	5,89	13,82	-3,41	4,14	10,50	-3,38	3,76	8,02	-1,76	2,59	2,27	2,98
t-value (difference)	3,16	7,21	0,55	-4,31	-6,69	-0,46	-2,20	-4,52	-0,29	-3,02	-4,27	-1,92	-6,12	-11,09	-4,61	-5,50	-9,85	-4,32	-5,04	-8,03	-4,11	-3,11	-3,78	-3,08	0,73	0,90	0,42
Panel B: Regression Analysis																											
HOT	1,51	6,15	-0,05	-1,63	-2,70	-0,32	0,03	-0,27	0,20	-0,42	-0,89	-0,35	-2,26	-6,88	-3,48	-4,41	-8,32	-5,41	-3,38	-6,08	-4,08	-1,51	-4,56	-0,68	1,20	0,57	3,68
	1,38	*3,98*	*-0,03*	*-4,12*	*-4,72*	*-0,57*	*0,09*	*-0,53*	*0,38*	*-1,23*	*-1,86*	*-0,70*	*-2,71*	*-6,68*	*-2,41*	*-4,62*	*-6,81*	*-3,35*	*-3,39*	*-4,68*	*-2,41*	*-1,41*	*-3,25*	*-0,36*	*2,09*	*0,80*	*3,54*
M/B IPO	—	—	—	-0,03	0,05	-0,05	0,45	0,45	0,44	0,20	0,21	0,11	0,39	-0,23	1,40	0,43	-0,22	1,65	-2,00	-2,61	-0,32	-0,23	-0,31	0,02	0,49	0,55	0,26
	—	—	—	*-0,44*	*0,61*	*-0,42*	*7,46*	*5,95*	*4,11*	*3,18*	*2,76*	*0,97*	*2,95*	*-1,65*	*4,87*	*2,76*	*-1,25*	*5,07*	*-10,92*	*-12,64*	*-0,79*	*-1,27*	*-1,51*	*0,60*	*5,46*	*5,62*	*1,26*
M/B t-1	—	—	—	—	—	—	—	—	—	0,49	0,53	0,40	—	—	—	—	—	—	3,15	3,52	1,78	0,92	1,21	0,57	—	—	—
	—	—	—	—	—	—	—	—	—	*6,61*	*5,94*	*3,06*	—	—	—	—	—	—	*14,87*	*14,64*	*3,97*	*4,28*	*4,88*	*1,31*	—	—	—
EBITDA/At-1	-27,53	-28,81	-16,31	4,33	5,59	0,73	2,86	4,13	-1,42	4,06	3,72	1,94	—	—	—	—	—	—	—	—	—	—	—	—	3,05	3,36	3,66
	-22,97	*-19,52*	*-6,82*	*10,01*	*10,11*	*0,90*	*3,95*	*4,27*	*-1,13*	*6,70*	*4,71*	*1,83*	—	—	—	—	—	—	—	—	—	—	—	—	*4,87*	*4,88*	*2,45*
SIZEt-1	2,14	1,62	1,61	-1,18	-1,32	-0,70	-1,24	-1,46	-0,47	-0,70	-0,65	-0,36	4,42	4,76	5,75	5,37	6,20	6,93	5,08	5,43	6,69	5,73	5,65	7,18	0,72	0,75	0,44
	9,50	*5,46*	*3,82*	*-14,55*	*-11,99*	*-4,92*	*-14,57*	*-12,40*	*-3,18*	*-8,53*	*-5,75*	*-2,48*	*28,26*	*26,24*	*18,51*	*26,00*	*24,18*	*17,09*	*22,52*	*19,22*	*15,34*	*24,68*	*19,36*	*16,23*	*6,10*	*5,44*	*1,67*
PPE/At-1	-2,82	2,97	-8,21	20,06	21,69	14,17	23,94	24,41	21,18	19,50	19,69	16,72	8,35	2,60	3,96	18,40	13,83	0,80	15,47	12,62	1,47	20,22	19,73	9,06	-0,09	0,39	-2,88
	-1,35	*1,20*	*-1,88*	*26,69*	*23,70*	*9,58*	*28,37*	*23,84*	*12,29*	*25,84*	*21,34*	*10,90*	*5,27*	*1,58*	*1,04*	*8,44*	*5,71*	*0,15*	*6,99*	*5,00*	*0,28*	*8,55*	*7,07*	*1,68*	*-0,08*	*0,34*	*-1,05*
R&D/At-1	-0,69	-1,74	0,70	-0,44	-0,30	-0,54	-3,37	-4,18	-3,35	-1,34	-2,77	-0,30	-1,77	-1,95	-0,65	-73,87	-57,91	-79,14	-59,00	-62,58	-43,20	-23,97	-41,74	-18,96	0,27	0,38	0,17
	-1,32	*-2,58*	*0,88*	*-2,34*	*-1,20*	*-1,99*	*-2,09*	*-2,02*	*-1,32*	*-1,33*	*-2,01*	*-0,22*	*-4,54*	*-4,39*	*-0,95*	*-18,69*	*-12,17*	*-11,44*	*-22,49*	*-18,36*	*-10,40*	*-16,67*	*-15,18*	*-7,69*	*0,99*	*1,21*	*0,35*
RDDt-1	-1,06	0,68	-5,14	1,42	1,53	1,46	0,41	0,26	0,79	0,07	0,22	-0,37	7,00	3,77	8,24	2,30	1,30	1,38	0,88	-0,74	0,07	1,81	-0,46	1,22	0,98	1,01	0,43
	-1,00	*0,55*	*-2,29*	*3,71*	*3,34*	*1,91*	*1,03*	*0,54*	*1,01*	*0,19*	*0,49*	*-0,51*	*8,75*	*4,57*	*4,21*	*2,26*	*1,17*	*0,57*	*0,82*	*-0,61*	*0,03*	*1,61*	*-0,36*	*0,45*	*1,77*	*1,77*	*0,31*
R-squared	0,112	0,121	0,053	0,191	0,203	0,101	0,190	0,182	0,136	0,177	0,165	0,124	0,188	0,218	0,287	0,241	0,241	0,346	0,297	0,313	0,335	0,273	0,277	0,341	0,028	0,034	0,027
N	4760	3448	1312	4759	3447	1312	4797	3509	1288	4421	3228	1193	4759	3447	1312	4797	3509	1288	4421	3228	1193	3634	2662	972	4759	3447	1312

4.3 Short term market timing effect on capital structure

Panel A reports mean values for hot and cold market firms and the t-value of their difference. All values are reported in percentage terms. Panel B reports regressions for the whole sample period as well as subsamples 1971-1999 and 2000-2015. Regression form is as follows:

$$Y_t = x_0 + x_1 HOT + x_2 M/B_t + x_3 EBITDA/A_{t-1} + x_4 SIZE_{t-1} + x_5 PPE/A_{t-1} + x_6 R\&D/A_{t-1} + x_7 RDD_{t-1} x_6 + D/A_{t-1} + \varepsilon$$

The dependent variables, Y_t, Change in leverage, new equity issuance divided by year-end total assets, change in cash divided by year-end total assets, change retained earnings divided by year-end total assets and year-end leverage.

Table 4: Short-term market timing effect

	$D/A_t - D/A_{t-1}$			e/A_t			$\Delta Cash/A_t$			$\Delta RE/A_t$			D/A_t		
	71-15	71-99	00-15	71-15	71-99	00-15	71-15	71-99	00-15	71-15	71-99	00-15	71-15	71-99	00-15
Panel A: Mean Values															
HOT	-49,35	-44,31	-63,45	41,02	41,97	36,40	28,58	26,11	35,47	4,72	4,72	4,76	37,43	38,44	34,49
COLD	-42,02	-24,51	-58,34	33,91	32,44	36,58	21,80	14,47	28,57	7,10	7,85	4,08	41,12	42,77	39,17
t-value	-4,03	-10,08	-1,98	5,24	6,40	-0,06	5,92	9,17	3,69	-4,75	-6,18	0,49	-3,67	-3,63	-2,71
Panel B: Regression Analysis															
HOT	-1,38	-7,70	1,40	5,21	10,70	-3,18	2,58	6,35	-3,18	-2,54	-2,75	0,65	-3,68	-7,38	-1,05
	-1,38	*-5,67*	*0,87*	*4,54*	*8,06*	*-1,12*	*2,83*	*5,14*	*-1,12*	*-4,08*	*-3,90*	*0,36*	*-4,05*	*-6,06*	*-0,68*
M/Bt	-2,45	-2,88	-1,60	4,10	4,39	2,15	3,20	3,18	2,15	0,25	0,31	-0,18	-2,00	-2,52	-0,77
	-15,48	*-15,54*	*-4,96*	*18,65*	*18,78*	*3,20*	*22,07*	*18,78*	*3,20*	*1,79*	*2,08*	*-0,41*	*-13,96*	*-15,17*	*-2,51*
EBITDA/At-1	6,19	3,68	1,51	11,58	12,20	26,72	-7,46	-6,19	26,72	7,99	8,29	2,00	-1,50	-2,94	-5,40
	5,36	*2,67*	*0,64*	*6,45*	*6,21*	*4,86*	*-7,06*	*-4,92*	*4,86*	*4,58*	*4,46*	*0,32*	*-1,43*	*-2,37*	*-2,38*
SIZEt-1	35,41	4,07	3,16	-6,16	-6,21	-7,85	-3,68	-4,25	-7,85	-1,10	-1,32	-0,33	4,49	4,41	5,35
	17,08	*15,53*	*10,17*	*-25,19*	*-21,67*	*-11,60*	*-19,42*	*-17,69*	*-11,60*	*-6,51*	*-6,80*	*-0,55*	*23,91*	*18,74*	*13,62*
PPE/At-1	5,15	1,05	-0,63	-2,86	-1,27	-1,94	-1,70	-2,70	-1,94	-2,54	-2,80	0,78	6,85	5,71	2,18
	2,71	*0,48*	*-0,88*	*-1,28*	*-0,53*	*-0,29*	*-0,97*	*-1,36*	*-0,29*	*-1,87*	*-1,92*	*0,16*	*3,97*	*2,94*	*0,53*
R&D/At-1	-0,11	-0,16	-0,16	1,63	1,52	28,34	2,84	2,50	28,34	-1,91	-2,47	15,50	0,06	-0,37	0,24
	-0,23	*-0,26*	*-0,21*	*2,74*	*2,72*	*2,52*	*6,62*	*4,68*	*2,52*	*-0,61*	*-0,73*	*1,76*	*0,14*	*-0,69*	*0,32*
RDDt-1	10,95	8,50	14,69	-3,21	-3,74	2,23	-7,73	-7,90	2,23	-1,34	-1,77	3,78	8,01	7,15	8,16
	11,30	*7,83*	*6,70*	*-2,86*	*-3,17*	*0,60*	*-8,68*	*-7,90*	*0,60*	*-1,93*	*-2,38*	*1,67*	*9,11*	*7,33*	*3,88*
D/At-1	-101,24	-95,31	-112,50	28,10	24,54	40,52	8,10	5,71	40,52	3,59	3,45	1,47	21,52	22,89	17,62
	-74,35	*-61,25*	*-39,70*	*16,37*	*13,29*	*8,58*	*6,48*	*4,03*	*8,58*	*3,21*	*2,87*	*0,40*	*17,43*	*16,37*	*6,40*
R-squared	0,643	0,647	0,639	0,320	0,332	0,347	0,300	0,322	0,347	0,066	0,079	0,505	0,245	0,260	0,217
N	4759	3447	1312	2988	2417	571	4640	3356	571	1849	1659	190	4759	3447	1312

Table 4 shows that leverage ratios at the end of IPO year of hot market firms are less than their cold market counterparts. The difference is over 10% and is almost identical in both subsamples. This is consistent with the results on table 2 that hot market firms raise more capital in their IPOs.

Despite the differences in book leverages between hot and cold market firms being almost equal in both subsamples it must be noted that pre-IPO leverage was larger in hot market firms for 71-99 period whereas it was the same in 00-15 period. The difference between hot

and cold market firm IPO proceeds was smaller in the more recent sample than the sample from 1971 to 1999.

The results also show that hot market firms increase their cash holdings more than cold market firms, which implies that hot market firms use the opportunity to raise more capital than they would necessarily need which is consistent with the findings of Chemmanur and He (2011).

Further analyzing the data, I find that even though the results from 1971-1999 and 2000-2015 subsamples are mostly in line with each other, the regression analysis shows that market timing variable has lost its significance in the more recent sample when it comes to leverage levels.

4.4 Persistence of market timing effect on capital structure

Table 4 reported that hot market firms were significantly less leveraged in the IPO year. Table 5 panel A reports mean values for the difference between leverage in time t and pre-IPO as well as leverage in time t. Panel B reports regression analysis for regression of the following form:

$$Y_t = x_0 + x_1 HOT + x_2 M/B_t + x_3 EBITDA/A_{t-1} + x_4 SIZE_{t-1} + x_5 PPE/A_{t-1} + x_6 R\&D/A_{t-1} + x_7 RDD_{t-1}\, x_6 + D/A_{t-1} + \varepsilon$$

The dependent variables, Y_t, Cumulative change in leverage from pre-IPO time and Leverage in time t.

Despite only the 2000-2015 sample having equal pre-IPO leverage between hot and cold market firms, the leverages for hot and cold market firms converges to being equal after the IPO for both subsamples. This effect is persistent several years after the IPO and does not show signs of changing. Cumulative change from pre-IPO leverage displays the same effect which is that the differences between hot and cold market firms do not differ from each other statistically a year after the IPO, but the earlier subsample shows persistently over 15 percentage point difference between hot and cold market firms.

Table 5: Persistence of market timing effect on capital structure

Panel A reports averages for selected hot and cold market firm variables and the t-value of their difference. All values are reported in percentage terms and all regressions consider the industry fixed effect defined by 3-digit SIC code. Panel B includes regression coefficients of regressions of the form:

$$Y_t = x_0 + x_1 HOT + x_2 M/B_{IPO} + x_3 M/B_{t-1} + x_4 EBITDA/A_{t-1} + x_5 SIZE_{t-1} + x_6 PPE/A_{t-1} + + x_7 R\&D/A_{t-1} + x_7 RDD_{t-1} + \varepsilon$$

Dependent variable Y_t is pre-IPO book leverage, capital expenditures divided by total assets, EBITDA / Total Assets and pre-IPO dividend to book equity. All regressions consider the industry fixed effect defined by 3-digit SIC code.

	D/At - D/A$_{pre\,IPO}$												Leverage D/A$_t$											
	IPO + 1			IPO + 2			IPO + 3			IPO + 4			IPO + 1			IPO + 2			IPO + 3			IPO + 4		
	71-15	71-99	00-15	71-15	71-99	00-15	71-15	71-99	00-15	71-15	71-99	00-15	71-15	71-99	00-15	71-15	71-99	00-15	71-15	71-99	00-15	71-15	71-99	00-15
Panel A: Mean Values																								
HOT	-47,32	-42,08	-62,03	-44,16	-38,85	-59,02	-41,01	-35,77	-55,74	-38,67	-34,06	-52,09	39,91	40,69	37,64	42,90	43,38	41,54	45,56	45,88	44,64	46,27	46,46	45,72
COLD	-42,65	-24,18	-59,84	-40,58	-22,41	-57,65	-38,45	-20,42	-55,96	-33,84	-17,80	-50,98	40,57	41,97	38,93	42,51	42,74	42,24	43,53	44,25	42,63	45,79	46,48	44,89
t-value	-2,48	-8,65	-0,77	-1,74	-7,29	-0,44	-1,150	-6,275	0,063	-1,97	-6,01	-0,28	-0,67	-1,01	-0,80	0,36	0,46	-0,39	1,79	1,13	1,06	0,38	-0,01	0,39
Panel B: Regression Analysis																								
HOT	0,88	-5,00	2,86	0,48	-5,53	3,22	0,05	-7,45	4,72	-2,13	-8,96	4,20	-0,91	-4,23	0,90	-1,51	-3,91	-0,24	0,40	-0,74	2,98	0,02	-1,58	3,30
	0,84	*-3,35*	*1,85*	*0,38*	*-3,04*	*1,69*	*0,03*	*-2,85*	*1,49*	*-0,97*	*-3,18*	*1,11*	*-0,96*	*-3,24*	*0,57*	*-1,43*	*-2,69*	*-0,14*	*0,34*	*-0,46*	*1,49*	*0,01*	*-0,90*	*1,55*
M/Bt	-2,42	-2,82	-1,54	-2,42	-2,64	-1,52	-1,92	-1,80	-1,35	-1,70	-0,89	-1,47	-1,98	-2,42	-0,95	-1,78	-2,21	-0,80	-1,60	-2,15	-0,22	-1,04	-1,26	0,00
	-14,48	*-14,06*	*-4,86*	*-10,25*	*-9,15*	*-3,65*	*-4,99*	*-4,07*	*-1,84*	*-4,13*	*-1,99*	*-1,78*	*-13,11*	*-13,75*	*-2,93*	*-9,08*	*-9,55*	*-2,07*	*-6,92*	*-7,87*	*-0,48*	*-4,35*	*-4,39*	*0,00*
EBITDA/At-1	-4,09	-10,65	-10,99	-18,07	-24,17	-17,69	-20,09	-32,17	-29,31	-21,95	-39,76	-26,56	-19,68	-23,04	-25,58	-29,04	-27,64	-38,83	-35,72	-35,32	-39,76	-10,61	-42,80	-41,83
	-2,00	*-4,04*	*-2,98*	*-8,13*	*-8,66*	*-4,32*	*-5,92*	*-8,26*	*-4,14*	*5,76*	*-8,79*	*-3,52*	*-10,65*	*-9,96*	*-6,78*	*-15,73*	*-12,36*	*-10,24*	*-17,49*	*-14,67*	*-8,87*	*-18,35*	*-15,25*	*-9,77*
SIZEt-1	3,41	4,26	4,38	3,73	4,74	3,69	0,71	1,64	1,71	0,88	1,46	1,93	3,91	3,98	4,96	4,46	4,49	5,26	4,15	3,79	5,04	3,82	3,61	4,25
	14,45	*13,51*	*10,02*	*12,43*	*11,96*	*6,59*	*1,56*	*2,90*	*1,93*	*1,71*	*2,40*	*1,85*	*18,25*	*14,40*	*11,10*	*17,88*	*14,14*	*10,15*	*15,18*	*10,86*	*8,98*	*12,73*	*9,55*	*7,18*
PPE/At-1	25,61	23,92	16,34	32,22	29,90	24,15	35,46	30,13	33,06	32,52	29,14	32,49	24,88	24,29	19,84	29,94	27,87	29,31	24,93	23,61	28,18	22,46	22,81	24,71
	10,83	*8,60*	*3,22*	*11,73*	*9,14*	*4,07*	*8,40*	*6,28*	*3,43*	*6,85*	*5,44*	*3,01*	*11,62*	*9,96*	*3,82*	*13,12*	*10,63*	*5,33*	*9,81*	*7,96*	*4,62*	*8,06*	*6,86*	*4,03*
R&D/At-1	-15,92	-14,81	-19,37	-14,68	-18,44	-10,21	-24,30	-22,95	-20,20	5,07	-16,59	16,41	10,63	6,33	12,71	8,42	7,61	5,48	4,53	6,94	-1,58	5,03	-2,41	7,62
	-3,59	*-2,70*	*-2,61*	*-4,07*	*-3,84*	*-1,89*	*-4,30*	*-3,33*	*-2,11*	*1,35*	*-2,83*	*3,31*	*2,65*	*1,32*	*1,67*	*2,81*	*1,98*	*1,10*	*1,33*	*1,63*	*-0,26*	*2,30*	*-0,66*	*2,71*
RDDt-1	9,88	8,63	10,59	13,47	12,27	15,25	15,92	11,05	23,59	16,52	10,10	21,92	9,27	8,34	9,90	10,83	10,15	11,53	10,88	10,40	10,93	10,02	8,92	10,09
	9,11	*6,87*	*4,64*	*10,25*	*7,87*	*5,56*	*7,84*	*4,87*	*5,15*	*7,47*	*4,21*	*4,09*	*9,44*	*7,57*	*4,24*	*9,92*	*8,12*	*4,54*	*8,91*	*7,42*	*3,78*	*7,80*	*5,99*	*3,32*
D/At-1	-108,11	-102,78	-119,90	-112,33	-107,89	-119,94	-8,79	-15,56	-4,59	-8,22	-16,55	-4,25	17,35	19,34	12,34	16,18	17,55	14,44	0,93	0,77	0,94	0,68	1,01	0,42
	-77,62	*-62,41*	*-44,55*	*-67,98*	*-54,72*	*-36,81*	*-24,17*	*-25,49*	*-9,74*	*-21,67*	*-24,57*	*-8,64*	*13,75*	*13,39*	*4,48*	*11,79*	*11,11*	*4,78*	*4,24*	*2,04*	*3,14*	*3,07*	*2,42*	*1,51*
R-squared	0,168	0,179	0,131	0,586	0,571	0,605	0,209	0,267	0,168	0,175	0,257	0,152	0,205	0,222	0,179	0,215	0,220	0,214	0,166	0,174	0,163	0,156	0,153	0,182
N	4628	3340	1288	4267	3075	1192	3891	2802	1089	3525	2556	969	4628	3340	1288	4267	3075	1192	3891	2802	1089	3525	2556	969

5. Further analysis on proceeds and leverage

As I examined the whole sample and both subsamples throughout this paper, I find it reasonable to do some additional tests concerning some other determinants than time period. Table 6 reports mean values for hot and cold market proceeds and book leverage from pre-IPO up to four years after the IPO as well as t-value of their difference. I also include the value for regression variable hot and its t-value, the R-squared for the model and number of observations. I get two almost equally large samples by dividing firms with pre-IPO sales of over and under $50m. Dividing the sample with pre-IPO leverage of under and over 50% I find that around 17% of the firms had pre-IPO leverage under 50% and 83% over 50%.

From the results in table 6, I find that hot market firms with less than $50m in pre-IPO sales raised more than twice the amount of proceeds compared to hot IPO firms with over $50m in pre-IPO sales. The difference between cold market firms' IPO proceeds with sales under and over $50m was much smaller but still over 50%. Smaller firms clearly raise more capital compared to larger firms. Pre-IPO leverage for smaller firms measured in pre-IPO sales shows that smaller firms' pre-IPO leverage between hot and cold market firms differ significantly. Smaller firms hot market firms are much more leveraged than cold market firms while there is no difference between larger hot and cold market firms' pre-IPO leverage.

When dividing firms based on pre-IPO leverage, I see that firms with larger leverage raise more capital than lesser levered firms. The differences between hot and cold market firms' proceeds of high levered firms smaller than those of lower levered firm's, which suggests that higher levered firms need more capital regardless of market timing attempts.

Hot market effect is strong with all results regarding IPO proceeds but shows the most effect in smaller and high levered firms.

Table 6: Further analysis on IPO proceeds and leverage

Table 6 reports averages for hot and cold market firm variables, t-value of their difference. Regression variable Hot for leverage and primary proceeds regressions are also reported. All regressions consider the industry fixed effect defined by 3-digit SIC code.

HOT market coefficient for a regression where the dependent variable is D/A is of the form:

$$Y_t = x_0 + x_1 HOT + x_2 M/B_{IPO} + x_3 M/B_{t-1} + x_4 EBITDA/A_{t-1} + x_5 SIZE_{t-1} + x_6 PPE/A_{t-1} + + x_7 R\&D/A_{t-1} + x_7 RDD_{t-1} + \varepsilon$$

HOT market coefficient for a regression where the dependent variable is Primary proceeds divided by pre-IPO assets is of the form:

$$Y_t = x_0 + x_1 HOT + x_2 M/B_t + x_3 EBITDA/A_{t-1} + x_4 SIZE_{t-1} + x_5 PPE/A_{t-1} + x_6 R\&D/A_{t-1} + x_7 RDD_{t-1}\, x_6 + D/A_{t-1} + \varepsilon$$

		D/A$_t$					
Pre-IPO sales under $50m	**Proceeds$_p$/A$_{t-1}$**	**pre-IPO**	**IPO**	**IPO + 1**	**IPO + 2**	**IPO + 3**	**IPO + 4**
HOT	236,76	79,92	28,27	32,43	36,61	40,35	41,08
COLD	154,97	71,12	35,23	36,29	39,08	39,81	43,26
t-value (difference)	7,89	4,76	-5,29	-2,79	-1,55	0,33	-1,12
HOT	43,76	—	-6,70	-3,58	-4,38	-2,25	-2,44
t-value	4,70	—	-4,74	-2,41	-2,61	-1,31	-1,18
R2	0,334	—	0,089	0,171	0,224	0,187	0,198
N	2294	—	2293	2251	2070	1885	1705
Pre-IPO sales over $50m							
HOT	101,50	76,52	47,06	47,74	49,33	50,85	51,45
COLD	90,59	77,37	46,78	44,70	45,78	46,95	47,95
t-value (difference)	1,50	-0,04	0,19	2,21	2,41	2,55	2,08
HOT	6,05	—	0,16	2,96	2,41	3,34	2,71
t-value	0,85	—	0,12	2,27	1,69	2,22	1,61
R2	0,157	—	0,193	0,172	0,162	0,179	0,120
N	2465	—	2464	2377	2197	2006	1820
D/A$_{pre\text{-}IPO}$ > 0,5							
HOT	172,25	87,45	38,95	41,59	44,73	47,31	48,00
COLD	123,63	84,61	44,05	43,55	45,36	46,13	47,43
t-value (difference)	6,76	3,53	-4,17	-1,60	-0,47	0,86	0,37
HOT	23,07	—	-4,31	-1,40	-1,75	-0,22	-0,12
t-value	3,82	—	-4,02	-1,29	-1,45	-0,17	-0,08
R2	0,355	—	0,181	0,179	0,194	0,157	0,157
N	3966	—	3966	3843	3524	3206	2898
D/A$_{pre\text{-}IPO}$ < 0,5							
HOT	162,90	31,22	25,97	30,41	30,41	36,38	37,11
COLD	102,77	30,95	28,54	28,98	28,98	33,23	37,60
t-value (difference)	4,33	0,19	-1,36	0,81	0,47	1,37	-0,18
HOT	33,07	—	-1,96	0,75	-1,49	0,19	-1,48
t-value	1,92	—	-1,08	0,36	-0,62	0,07	-0,51
R2	0,145	—	0,186	0,188	0,188	0,224	0,160
N	793	—	791	785	743	685	627

6. Conclusions

While there are many similarities between the samples concerning the differences between hot and cold market firms, I also find many differences between the samples.

Hot market firms raise on average 51% more proceeds compared to IPO year-end assets and 98% more compared to pre-IPO assets during 1971-1999. The corresponding figures for 2000-2015 sample are 16% more and 39%. While hot markets firms still raise significantly more proceeds, the difference between hot and cold market firms has decreased. At the same time proceeds raised by both hot and cold market firms have increased significantly from the 1971-1999 sample.

Regression analysis shows that the pure market timing effect, defined by regression coefficient for market timing, during the 1971-199 sample is almost equal to the differences between hot and cold market proceeds. This is consistent with the findings of Alti (2006). However, when examining the subsample starting from 2000, I find that while the difference between hot and cold market proceeds is still significant, the effect of pure market timing has virtually no effect on the difference.

Although, the difference between hot and cold markets proceeds decrease significantly from 1971-1999 sample to 2000-2015 sample, there is still a significant difference in the amount of proceeds. Accordingly, hot market firms decrease their leverage more than cold market firms do.

The difference between cumulative change in pre-IPO leverage is significantly different between hot and cold market firms for at least four years after the IPO for the 1971-1999 sample. The 2000-2015 sample shows very little persistence of the effect which market timing has on capital structure. The difference of cumulative change from pre-IPO leverage is insignificant only a year after the IPO. I conclude that the persistence of market timings' effect has decreased significantly from 1971-1999 sample to 2000-2015 sample.

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